f	**Fermi National Accelerator Laboratory** **Batavia, IL 60510**

CMS ME3/1 CATHODE LOWER PANEL FR-4 BAR GLUING TRAVELER

Reference Drawing(s)
Endcap Muon Chamber ME3/1 Final Assembly 5520-ME-368310

Endcap Muon Chamber ME3/1 Lower Cathode Panel Assembly 5520-ME-368314

Budget Code:	**Project Code:**
Released by:	**Date:**
Prepared by: M. Hubbard, B. Jensen, L. Lee	

Title	Signature	Date
TD / E&F Process Engineering	**Bob Jensen/Designee**	
TD / E&F CMS Assembly	**Glenn Smith/Designee**	
TD / E&F Technological Physicist	**Oleg Prokofiev/Designee**	
TD / CMS Project Manager	**Giorgio Apollinari/Designee**	

Revision Page

Revision	Step No.	Revision Description	TRR No.	Date
None	N/A	Initial Release	N/A	04/26/00

Ensure appropriate memos and specific instructions are placed with the traveler before issuing the sub traveler binder to production.

1.0 General Notes

1.1 White (Lint Free) Gloves (Fermi stock 2250-1800) or Nitrile Gloves (Fermi stock 2250-2040) or equivalent, shall be worn by all personnel, as required, when handling all product parts after the parts have been prepared/cleaned.

1.2 All steps that require a sign-off shall include the Technician/Inspectors first initial and full last name.

1.3 No erasures or white out will be permitted to any documentation. All incorrectly entered data shall be corrected by placing a single line through the error, initial and date the error before adding the correct data.

1.4 All Discrepancy Reports issued shall be recorded in the left margin next to the applicable step.

1.5 All personnel performing steps in this traveler must have documented training for this traveler and associated operating procedures.

1.6 Personnel shall perform all tasks in accordance with current applicable ES&H guidelines and those specified within the step.

1.7 Cover the panel/chamber with Mylar when not being serviced or assembled.

1.8 Never hand pass anything over a panel as dropped items may damage the panel.

2.0 Parts Kit List

2.1 Attach the completed Parts Kit List for the CMS Cathode Lower (CL) Panel Gluing to this traveler. Ensure that the serial number on the Parts Kit List matches the serial number of this traveler. Verify that the Parts Kit received is complete.

_____ _____

Process Engineering/Designee Date

3.0 Panel Preparation

Completed

3.1 Acquire the Cathode Lower Panel (ME-368314) as per the Panel Serial Number at the bottom of this traveler. ❒

3.2 Clean the entire panel (both sides) with Ethyl Alcohol (Fermi Stk. No. #1920-0600) and a low-lint wipe (Fermi Stk No. 1660-2500) to remove any dirt, dusts, oils, and other foreign material on the panel. ❒

3.3 Acquire FR-4 Isolation Strips (MA-368465 [2ea]) and clean with Ethyl Alcohol (Fermi Stk No. 1920-0600) and a low-lint wipe (Fermi Stk No. 1660-2500). ❒

3.4 Acquire the following gap bars; (MA-368464 [1 ea], MA-368463 [1 ea], MA-368193 [1 ea,], and MA-368460 [1 ea]) and clean with Ethyl Alcohol (Fermi Stk. No. #1920-0600) and a low-lint wipe (Fermi Stk No. 1660-2500) to remove any dirt, dusts, oils, and other foreign material. Clean out the grooves in the gap bars with cotton swabs dipped in the ethyl alcohol. ❒

3.5 Load one gap bar into the tape installation machine (MD-XXXXXX)(or if preferred, affix gap bar with Adhesive tape by hand) and affix 3M Scotch double side adhesive tape (F9469 PC) to the back of the gap bar. Trim both ends to fit. Trim out the holes and trim the tape where there is overlap on the side of the gap bars. Continue until all gap bars are completed. ❒

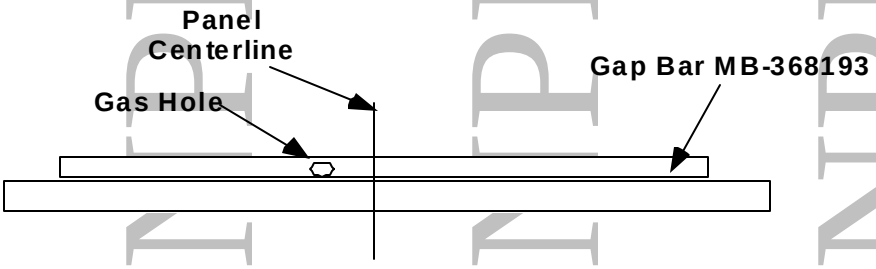
_____ _____

Technician(s) Date

Completed

3.6 Mix glue (Epoxy Adhesive #2216 Parts A&B) in a 50/50 ratio using approximately 30 grams of each. Allow the glue to sit for at least 30 minutes and no more than 45 minutes. ❒

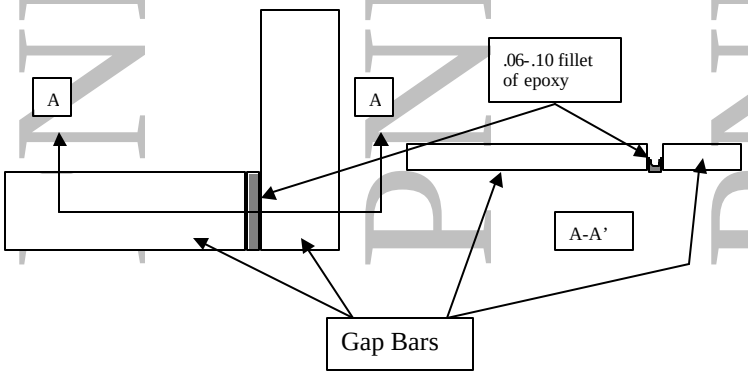
3.7 When applying the Gap Bar (MB-368193) to the panel, be sure the gas hole in gap bar is located on the left side of the Panel Center line. ❒



3.8 Without removing the protective strip, align the gap bars along the panel. Install the pins (MA-368941) through the holes in the gap bar and into panel to make sure the gap bar holes and panel holes align. ❒

3.9 Remove Gap Bars from the panel and remove the adhesive tape protective strip. ❒

3.10 Apply glue (Epoxy Adhesive #2216 Translucent) with a small brush to all the interfacing ends of the gap bars to create a fillet between the Gap Bar and the panel copper. Realign the gap bars onto the pins. Continue installing gap bars in this way until all gap bars are installed onto the panel. Ensure all alignment pins are removed from the gap bars once they are correctly taped in place. ❒



Note(s):

Panels must be glued and clamped the same day the Gap Bars are installed!

During the installation of the gap bars, ensure correct placement of the gap bars as per the angle cut on the gap bar ends.

During the installation of the gap bars, visually check all four corners to ensure proper fit of gap bar interfaces.

Ensure the panel is covered with Mylar when the panel is not being serviced

_____ _____

Technician(s) Date

4.0 Panel Gluing

Completed

Note(s):

The gluing of the Cathode Panels requires two days. On one day, one Upper and two Inner Panel sides will be glued. On the following day, one Lower and the other two sides of the Inner Panels will be glued.

On the day this Lower Cathode Panel is NOT being glued, place it on the Cathode curing table in the proper order according to the drawing below step 5.3.

4.1 Transport the Cathode Lower Panel with gap bars installed to the Panel Gluing Table. Install the Cathode Panel onto the Gluing Table work surface and pin the panel into position ❒

4.2 Apply a piece of Scotch tape (Fermi Stk. No. #1365-10400) to all the seams of the already applied gap bars, to prevent the glue from seeping out of the seams. Put a visible small mark with a marker on the piece of scotch tape to ensure the tape is removed, once the epoxy is cured. ❒

4.3 Using a syringe, apply glue (Epoxy Adhesive #2216 Translucent) to the isolation strip areas. Install the Isolation Strips onto the panel over the glue and work the epoxy toward the outer edges of the Isolation Strips. ❒

4.4 Using a syringe, apply glue (Epoxy Adhesive #2216 Translucent) to the inside perimeter of the FR-4 Gap Bars. ❒

4.5 Using a syringe, apply glue (Epoxy Adhesive #2216 Translucent) to the outside perimeter of the FR-4 Gap Bars. ❒

_____ _____

Technician(s) Date

5.0 Panel Staging

Completed

5.1 Remove the alignment pins from the Cathode Lower Panel. ❒

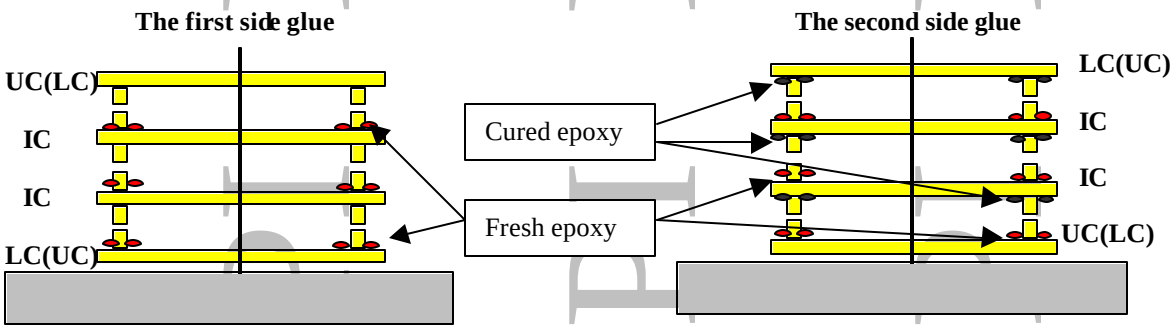
5.2 Transport the Cathode Lower Panel with gap bars installed to the Cathode Panel Curing Staging Area. ❒

5.3 Set Panel on the Cathode Curing Table. Panel order will be in accordance with the drawing. Install technological alignment pins(McMaster-Carr 90139A134). ❒

Note(s):

Panels with fresh epoxy must be positioned so the fresh epoxy is on the top side of the panel.

Clamping Table #2 is for reference only. Clamping Table #2 shows panel stack up when doing day two anode panel gluing.



Clamping table 1 **Clamping table 2**

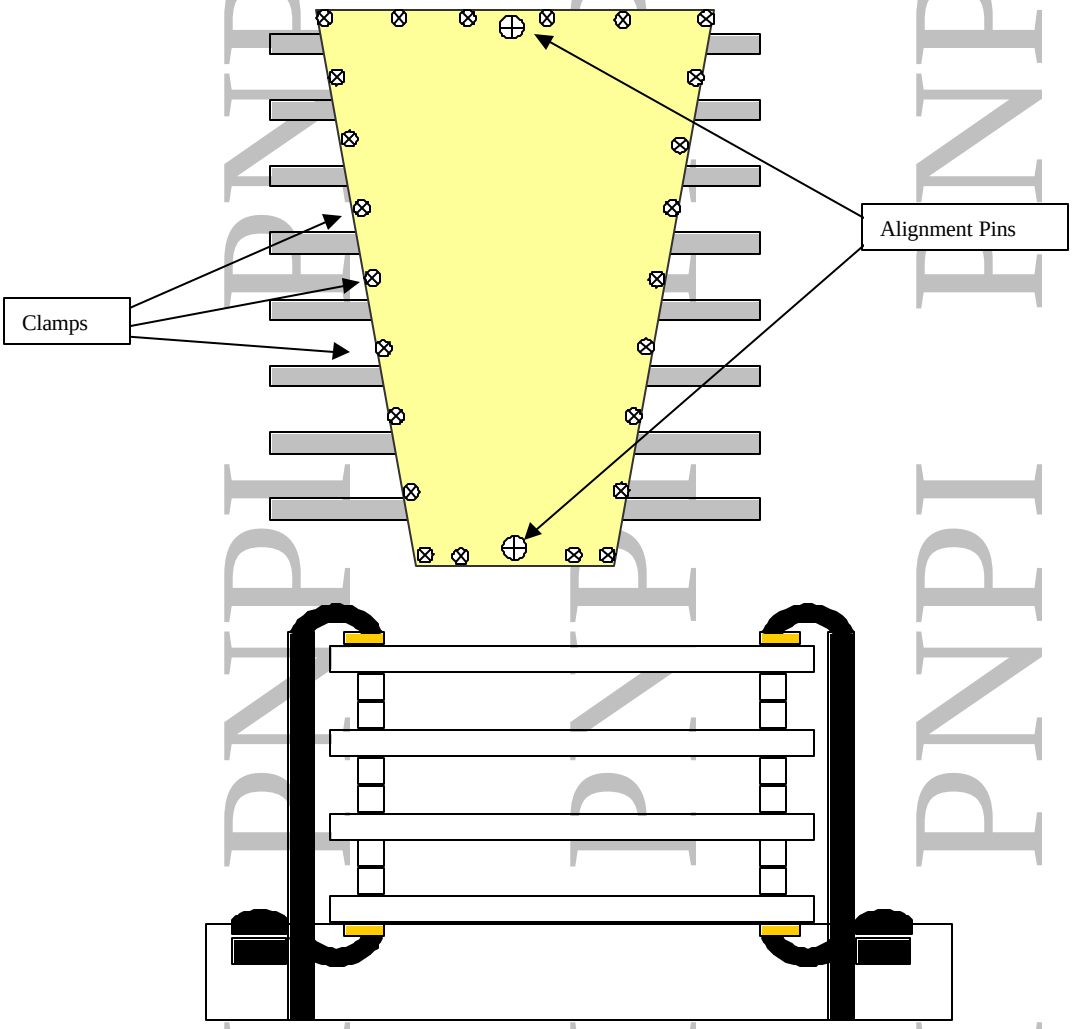
Technician(s) Date

Completed

5.4 Positioning the Quick Grip Clamp Bars (McMaster-Carr 5039A74) at 6” intervals, directly over the Gap Bars, clamp the panels to the table while the epoxy is curing. ❒

Note(s):

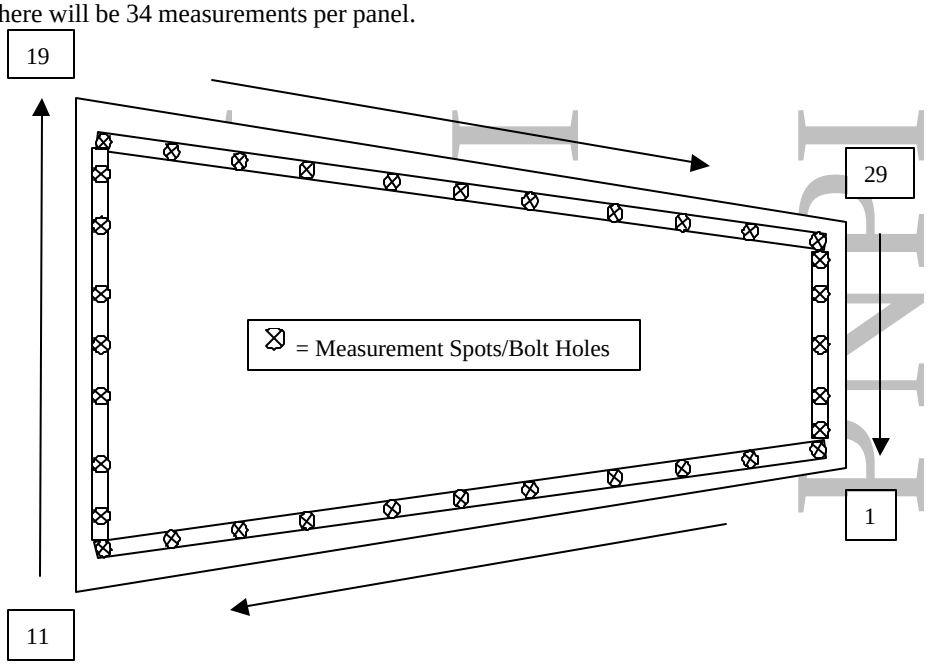
Ensure there is even spacing of the clamps all around the panels with clamps at each corner.



5.5 Once the epoxy has cured (after 24 hrs) remove alignment pins and clamps from panels. ❒

Technician(s) _____ Date _____

5.6 Using a Depth Micrometer measure the height of Gap bars from the panel surface. Measurements will be taken on the outside of the Gap bar close to the bolt holes. There will be 34 measurements per panel.



Acceptable Gap Bar height range: 0.370" to 0.380".

Position #	Pass	Fail	Position #	Pass	Fail
1			18		
2			19		
3			20		
4			21		
5			22		
6			23		
7			24		
8			25		
9			26		
10			27		
11			28		
12			29		
13			30		
14			31		
15			32		
16			33		
17			34		

Note(s):

After measurements are completed inform supervisor of any failures.
If all pass continue.

X 5.7 Panel has passed all Gap Bar Measurements and is acceptable for further processing.

_____ _____

Lead Person Date

5.8 Transport the Cathode panel to the Panel Staging Area.

_____ _____

Technician(s) Date

6.0 Production Complete

XXX 6.1 Process Engineering verify that the Cathode Lower Panel Traveler (5520-TR-333459) is accurate and complete. This shall include a review of all steps to ensure that all operations have been completed and signed off. Ensure that all Discrepancy Reports, Nonconformance Reports, Repair/Rework Forms, Deviation Index and dispositions have been reviewed by the Responsible Authority for conformance before being approved.

Comments:

_____

_____ _____

Process Engineering/Designee Date

7.0 Attach the Process Engineering "OK to Proceed" Tag on the panel.

_____ _____

Process Engineering/Designee Date

8.0 Proceed to the next major assembly operation as required.